Appendix M1

Public Water System Analysis

DEXTER WILSON ENGINEERING, INC.

WATER • WASTEWATER • RECYCLED WATER

CONSULTING ENGINEERS

PUBLIC WATER SYSTEM ANALYSIS
FOR THE
RENZULLI ESTATES PROJECT
IN THE CITY OF SAN DIEGO

September 3, 2024

2234 FARADAY AVENUE • CARLSBAD, CA • (760) 438-4422

PUBLIC WATER SYSTEM ANALYSIS
FOR THE
RENZULLI ESTATES PROJECT
IN THE CITY OF SAN DIEGO

September 3, 2024

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Job No. 1107-001

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September 3, 2024

1107-001

Green Phair Scripps Partners LLC
945 East J. Street
Chula Vista, CA 91910

Attention: Austin Dias

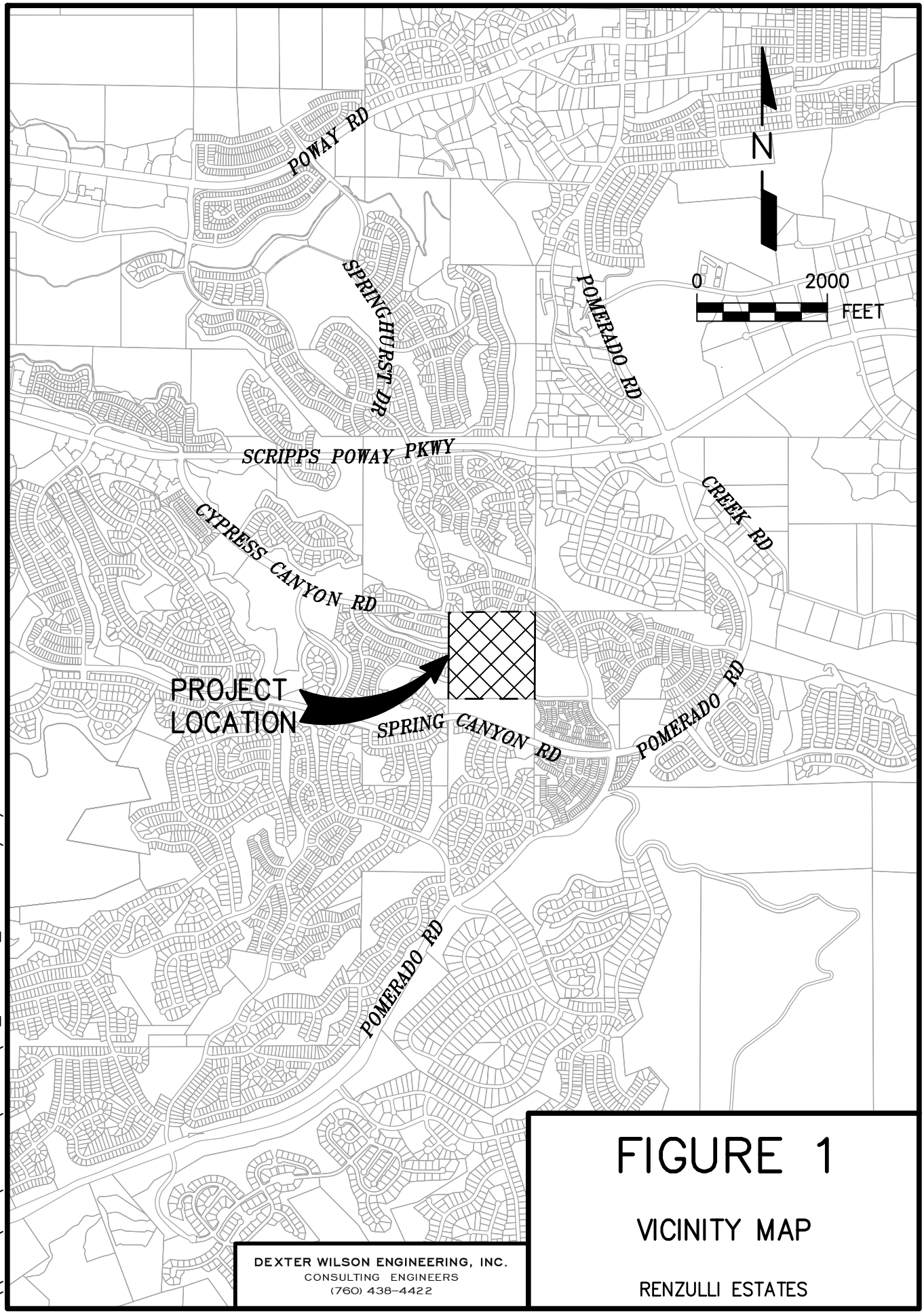
Subject: Public Water System Analysis for the Renzulli Estates Project in the City of San Diego

Introduction

This report is a revision to the May 2024 report to include an approved deviation request; there have been no revisions to the water system analysis or recommendations. This report provides a public water system analysis for the Renzulli Estates project in the City of San Diego. The project is located in the Scripps Miramar Ranch community, east of Interstate 15, and south of Scripps Poway Parkway. Figure 1 provides a location map for the project. The purpose of this report is to provide a revised analysis based on the project redesign.

The project encompasses approximately 40.58 gross acres (35.79 net acres) and the existing development presently consists of a single-family residence, miscellaneous outbuildings, and open space. The project proposes to redevelop the site into a 100 unit single family subdivision and a multi-family parcel with 12 units.

Topography of the site drains from south to north. Pad elevations on the site range from a low of 770.0 feet to a high of 901.2 feet.



\\ARTIC\DWG\1107001\REPORT\RE_FIGURE-1_VM.DWG 5/20/2024 1:55:26 PM LAYOUT:8x11 USER:Donald

FIGURE 1

VICINITY MAP

RENZULLI ESTATES

DEXTER WILSON ENGINEERING, INC.
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(760) 438-4422

Purpose of Study

The purpose of this study is to evaluate the ability of the existing and proposed public water system to provide adequate domestic and fire protection service to the Renzulli Estates project. This report is prepared based on the San Diego Public Utilities Department, Water Facility Design Guidelines (Water Facility Design Guidelines).

Study Area

The study area for this report is the boundary of the Renzulli Estates project and the adjacent water distribution system. The extent of the existing water system which was incorporated into the analysis of the Renzulli Estates project is the existing 1020 Scripps Ranch Pressure Zone.

Water System Design Criteria

The design criteria utilized in the analysis of the Renzulli Estates project water system are in consideration of the Water Facility Design Guidelines. The design criteria include a minimum static pressure of 65 pounds per square inch (psi) and maximum static pressure of 120 psi. Domestic residual pressures with all pipes in service must be a minimum of 40 psi and pressure loss at any location must not exceed 25 psi below static pressure. With one source out of service, domestic pressures may fall more than 25 psi below static pressure, but domestic pressure at all locations shall be greater than 40 psi.

For fire flow scenarios, a minimum residual pressure of 20 psi is required in the area of the fire hydrant flow during maximum day demands. Velocities in distribution mains under maximum day demand plus fire flow must be less than 15 feet per second (fps).

Renzulli Estates Project Water Demand

Table 1 summarizes the water duty factors used for the land uses proposed for the project as well as the planning fire flow rates by land use category. Residential water duty factors are based on a unit demand of 150 gpd per person.

TABLE 1
WATER DUTY FACTORS

Land Use	Density DU/AC	Persons/ DU	Average Water Duty Factor	Fire Flow Requirement, gpm
Single Family Residential	<4	3.5	525 gpd/DU	1,500
Multi-Family Residential	<29	3.0	450 gpd/DU	3,000

Table 2 presents the project water demand for the Renzulli Estates project. As shown, the projected average daily water demand is 57,900 gpd (0.057 mgd or 39.9 gpm).

TABLE 2
RENZULLI ESTATES PROJECT
AVERAGE DAILY WATER DEMAND

Land Use	Quantity	Duty Factor	Average Water Demand, gpd
SF Residential	100 DUs	525 gpd/DU	52,500
MF Residential	12 DUs	450 gpd/DU	5,400
TOTAL	**112 DUs**	**-**	**57,900**

To convert average day demands to maximum daily demands and peak hour demands, Figures 2-2 and 2-1 from the Water Facility Design Guidelines were used, respectively. Using the peaking curves on Figure 2-2 for the "RS residential zoning or similar (1 – 14 dwelling unit/acre)", the maximum day peak factor is approximately 1.75, thus the projected maximum day demand for the project is 0.10 mgd (69.8 gpm). Using the peaking curves on Figure 2-1 for the "RS residential zoning or similar (1 – 14 dwelling unit/acre)", the peak hour factor is 3.5. In accordance with page 2-3 of the Water Facility Design Guidelines, an additional factor of 1.5 is added for a combined peak factor of 5.25 over average day, thus the projected peak hour demand for the project is 0.30 mgd (209.5 gpm). Appendix A presents the peaking factor curves showing how the peaking factors were derived.

Existing Water System

The existing water facilities in the vicinity of the Renzulli Estates project include the northern portion of the Scripps Ranch 1020 Pressure Zone and the Scripps Ranch Boosted 1150 Pressure Zone to the south. The project will receive service solely from the Scripps Ranch 1020 Pressure Zone.

Proposed Water Service to the Renzulli Estates Project

The proposed pad elevations for the Renzulli Estates project range from 852.5 feet to 899.4 feet. This results in static pressures ranging from 52 psi to 73 psi (based on the zone name). Using static pressure from the City fire flow test, static pressures will range from 48 psi to 69 psi. Table 3 provides the static pressures anticipated at the meter. For lots highlighted in green, the developer will be responsible for installing private boosting to achieve desired pressures and flow in each home as required.

The City-approved deviation request form to acknowledge these lots are outside City design criteria is provided in Appendix D.

TABLE 3
RENZULLI ESTATES
STATIC PRESSURE OVERVIEW

Lot Number	Pad Elevation, feet	Zone 1020 HGL, feet	Static Pressure, psi	Lot Number	Pad Elevation, feet	Zone 1020 HGL, feet	Static Pressure, psi
				51	891.3	1020.0	56
1	852.5	1020.0	73	**52**	892.2	1020.0	55
2	853.1	1020.0	72	**53**	899.4	1020.0	52
3	853.8	1020.0	72	**54**	898	1020.0	53
4	854.2	1020.0	72	**55**	897.3	1020.0	53
5	854.6	1020.0	72	**56**	896.4	1020.0	54
6	860.2	1020.0	69	**57**	895.7	1020.0	54
7	862.0	1020.0	68	**58**	894.8	1020.0	54
8	864.2	1020.0	68	**59**	894	1020.0	55
9	866.6	1020.0	66	**60**	889.6	1020.0	56
10	868.9	1020.0	65	**61**	886.5	1020.0	58
11	871.2	1020.0	64	**62**	883.5	1020.0	59
12	873.5	1020.0	63	**63**	880.5	1020.0	60
13	875.8	1020.0	62	**64**	877.5	1020.0	62
14	878.1	1020.0	61	**65**	874.5	1020.0	63
15	880.4	1020.0	60	**66**	871.4	1020.0	64
16	882.7	1020.0	59	**67**	868.2	1020.0	66
17	885	1020.0	58	**68**	858.4	1020.0	70
18	886.8	1020.0	58	**69**	858.8	1020.0	70
19	887.7	1020.0	57	**70**	860.2	1020.0	69
20	888.6	1020.0	57	**71**	860.6	1020.0	69
21	889.5	1020.0	57	**72**	861.1	1020.0	69
22	890.4	1020.0	56	**73**	861.6	1020.0	69
23	891.3	1020.0	56	**74**	862.1	1020.0	68
24	888.2	1020.0	57	**75**	862.5	1020.0	68
25	887.3	1020.0	57	**76**	864.8	1020.0	67
26	885.9	1020.0	58	**77**	864.6	1020.0	67
27	883.6	1020.0	59	**78**	864.3	1020.0	67
28	881.3	1020.0	60	**79**	863.4	1020.0	68
29	879	1020.0	61	**80**	862.5	1020.0	68
30	876.7	1020.0	62	**81**	862	1020.0	68
31	874.4	1020.0	63	**82**	861.6	1020.0	69
32	872.1	1020.0	64	**83**	861.1	1020.0	69
33	869.8	1020.0	65	**84**	860.7	1020.0	69
34	867.5	1020.0	66	**85**	860.2	1020.0	69
35	865.2	1020.0	67	**86**	859.8	1020.0	69
36	862.8	1020.0	68	**87**	859.5	1020.0	70
37	855.8	1020.0	71	**88**	859.2	1020.0	70
38	863.3	1020.0	68	**89**	858.8	1020.0	70
39	856.8	1020.0	71	**90**	858.4	1020.0	70
40	857.2	1020.0	71	**91**	857.9	1020.0	70
41	863.4	1020.0	68	**92**	857.4	1020.0	70
42	865.2	1020.0	67	**93**	857	1020.0	71
43	868.1	1020.0	66	**94**	856.5	1020.0	71
44	871.1	1020.0	65	**95**	856	1020.0	71
45	874.2	1020.0	63	**96**	855.5	1020.0	71
46	877.3	1020.0	62	**97**	855.1	1020.0	71
47	880.4	1020.0	60	**98**	854.6	1020.0	72
48	883.4	1020.0	59	**99**	854.2	1020.0	72
49	886.4	1020.0	58	**100**	853.5	1020.0	72
50	889.4	1020.0	57	**101**	890	1020.0	56
				Count of Lots =	**101**		
Count of Lots with <65 psi =	**45**						

Date: October 2023

All water mains proposed within the Renzulli Estates project shall be public. A 16-inch water line is proposed to run through the project and connect to the existing 16-inch public water lines in Cypress Canyon Road east and west of the project. 8-inch piping is proposed for the remainder of the project. Figure 2 presents the existing and proposed water system layout for the Renzulli Estates project.

Water System Computer Model

A public water system hydraulic analysis was prepared for the Renzulli Estates project to confirm that adequate flow and pressure can be provided by the existing and proposed public water system. Connection points to the existing system are as shown in Figure 2 and are at the western terminus of Cypress Canyon Road near Angelique Street and the eastern terminus of Cypress Canyon Road near Caminito Dulce. The project proposes to make two connections to the existing 16-inch pipeline in Cypress Canyon Road, along Angelique Street and Caminito Dulce. The critical analysis presented in this report will be to deliver maximum day demands plus fire flow needs with one source out of service.

The University of Kentucky KYPIPE computer program was used to conduct a hydraulic model of the existing and proposed water system within the study area. This computer program utilizes the Hazen-Williams equation for determining head loss in pipes; the Hazen-Williams "C" value used for all pipes is 120.

For computer modeling, a fire hydrant flow test was requested from the City, available in Appendix B. Appendix B also presents the calculation of the available hydraulic gradeline utilized in each of the model scenarios. The calculated grade line at the 1020 Pressure Zone hydrant is 1012 feet for domestic purposes and 976 feet for the maximum day demand plus fire flow for the single family residential units.

\\MERIDIAN\DWG\1107001\REPORT\RE_WTR_FIGURE-2_EXPROWTR.DWG 8/30/2024 12:38:53 PM LAYOUT:11x17 USER:Karam

NOTE 1

LOTS WITHIN THIS AREA RECEIVE STATIC PRESSURE LESS THAN 65 PSI. PRIVATE BOOSTER PUMPS MAY BE NECESSARY IN INDIVIDUAL PRIVATE LOTS TO ACHIEVE DESIRED PRESSURE AND FLOW.

CONNECT TO EXISTING 1020 ZONE

ZIRBEL CT

CYPRESS VALLEY DR

CYPRESS CYN RD (NORTH)

PUBLIC ST "A"

PUBLIC ST "B"

CYPRESS CYN RD

CYPRESS CANYON PARK DR

SEE NOTE 1

SERVICE LOCATION FOR AFFORDABLE HOUSING

CONNECT TO EXISTING 1020 ZONE

N

0 150 FEET

LEGEND

- PROJECT BOUNDARY
- EXISTING 1020 ZONE PUBLIC WATER LINE
- PROPOSED ONSITE 1020 ZONE PUBLIC WATER LINE
- EXISTING PUBLIC OFFSITE FIRE HYDRANT
- PROPOSED PUBLIC ONSITE FIRE HYDRANT

FIGURE 2

EXISTING AND PROPOSED WATER FACILITIES

RENZULLI ESTATES

DEXTER WILSON ENGINEERING, INC.
CONSULTING ENGINEERS
(760) 438-4422

Water System Analysis and Results

Results of the computer model hydraulic analysis are provided in Appendix C (one source); Exhibit A provides the corresponding computer model Node and Pipe Diagram. The system was modeled under average day demand, peak hour demand, and maximum day demand plus fire flow scenarios as discussed further below.

Maximum Day and Peak Hour Pressure Results and Discussion

The hydraulic model confirms the ability of the 1020 Pressure Zone to deliver adequate domestic service to Renzulli Estates during maximum day demand through peak hour demand. Residual pressures exceed the minimum requirement of 40 psi. Additionally, the pressure loss at any location is less than 25 psi below static pressure with once source closed. The model results in Appendix C demonstrate the recommended layout in Figure 2.

Maximum Day Plus Fire Flow Results and Discussion. The results of the computer analysis indicate that the proposed onsite improvements provide a minimum of 1,500 gpm of fire flow under maximum day demand conditions with a residual pressure of 20 psi to all proposed hydrants. This is satisfactory for the single-family lots. The maximum fire flow the 1020 Pressure Zone can deliver at 20 psi to the multi-family lot is 1,900 gpm.

While the proposed public 1020 Pressure Zone water system is not capable of delivering the 3,000 gpm multi-family fire flow requirement per the Water Design Guide, the final fire flow requirements established by the fire department may be equal to (or less than) what the system is capable of delivering. The project proposes to construct 12 multi-family units across two buildings. Each building has a square footage of approximately 4,100 square feet. Assuming each building is two stories, the fire flow area per multi-family residential building is 8,200 square feet. Appendix B of the California Fire Code presents construction type and its equivalent fire flow. Using the most restrictive construction type (Type V-B), the fire flow requirement for building areas between 7,701-9,400 square feet is 2,500 gpm. For a multi-family building with fire sprinklers, a 50% reduction in the fire flow requirement may be granted. This leads to the conclusion that the fire flow requirement for the multi-family units may be 1,250 gpm, which is less than the 1,900 gpm available to the site.

The above paragraph is intended to provide our understanding of a multi-family arrangement which may be accomplished based on review of Appendix B of the fire code. Final fire flow requirements for the multi-family product will be driven by size, materials of construction, and other factors which are beyond our expertise.

Conclusions and Recommendations

The following conclusions and recommendations are summarized based on the water system analysis prepared for the Renzulli Estates project.

1. The Renzulli Estates project consists of 100 single family residential units and a multi-family parcel with 12 units.

2. The project will obtain water service from the Scripps Ranch 1020 Pressure Zone. The project proposes to construct a 16-inch public water line through the project along Cypress Canyon Road, with connections in Angelique Street and Caminito Dulce.

3. Figure 2 provides the recommended onsite public water system to serve the Renzulli Estates project. Onsite piping will consist of a 16-inch public water line through the project with 8-inch water lines branching to the rest of the project.

4. The Renzulli Estates project has finished pad elevations ranging from 852.5 feet to 899.4 feet. This results in static pressures between 52 psi and 73 psi based on the zone name, while the Water Facilities Design Guidelines state static pressures must range from 65 psi to 120 psi. Table 3 identifies those lots which do not meet the requirement. The City-approved deviation request form is provided in Appendix D approving an exception on the design since the pressure is lower than the requirement.

5. Developer is responsible for installing private boosting to achieve desired pressures and flow in each home as required.

6. Residual pressures during maximum day demand and peak hour demand exceed 40 psi (with one source out of service) at all lots in accordance with the City's Water Facility Design Guidelines. Additionally, residual pressures drop less than 25 psi from static at all lots (with one source out of service) in accordance with the Water Facility Design Guidelines.

7. The proposed public water system can deliver 1,500 gpm fire flow (or more) under maximum day demand conditions with one source out of service to all locations within the single-family area of the project. The maximum fire flow that can be delivered to the multi-family site via the 1020 Pressure Zone alone is 1,900 gpm.

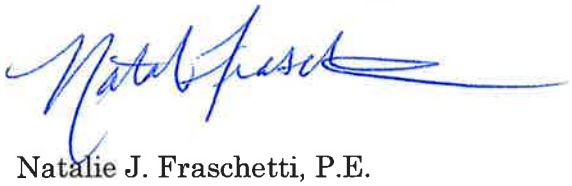
8. Under the proposed piping configuration, there are two dead-ends within the project. All have less than two fire hydrants and each has 30 residential units or less.

9. All services that will receive service pressures within the Renzulli Estates project in excess of 80 psi should have individual pressure regulators to meet Uniform Plumbing Code criteria.

10. Final design of the public water mains shall be in accordance with the City Design Guide and Approved Materials list.

We appreciate the opportunity to have provided you with this analysis. If you have any questions regarding the information or conclusions and recommendations presented in this report, please do not hesitate to contact me.

Dexter Wilson Engineering, Inc.



Natalie J. Fraschetti, P.E.

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Attachments

APPENDIX A

WATER DEMAND PEAKING FACTOR CHARTS

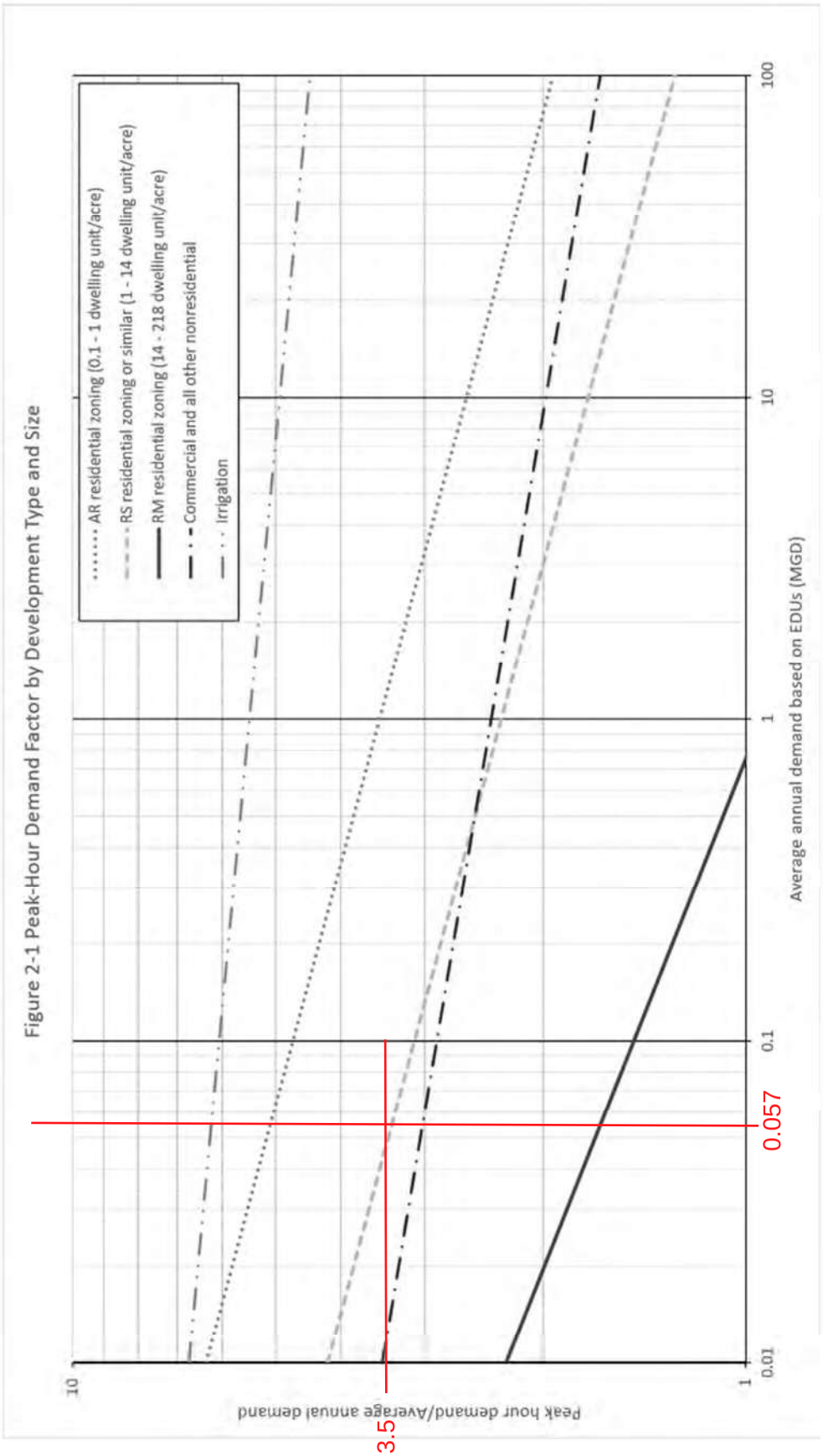


Figure 2-1 Peak-Hour Demand Factor by Development Type and Size

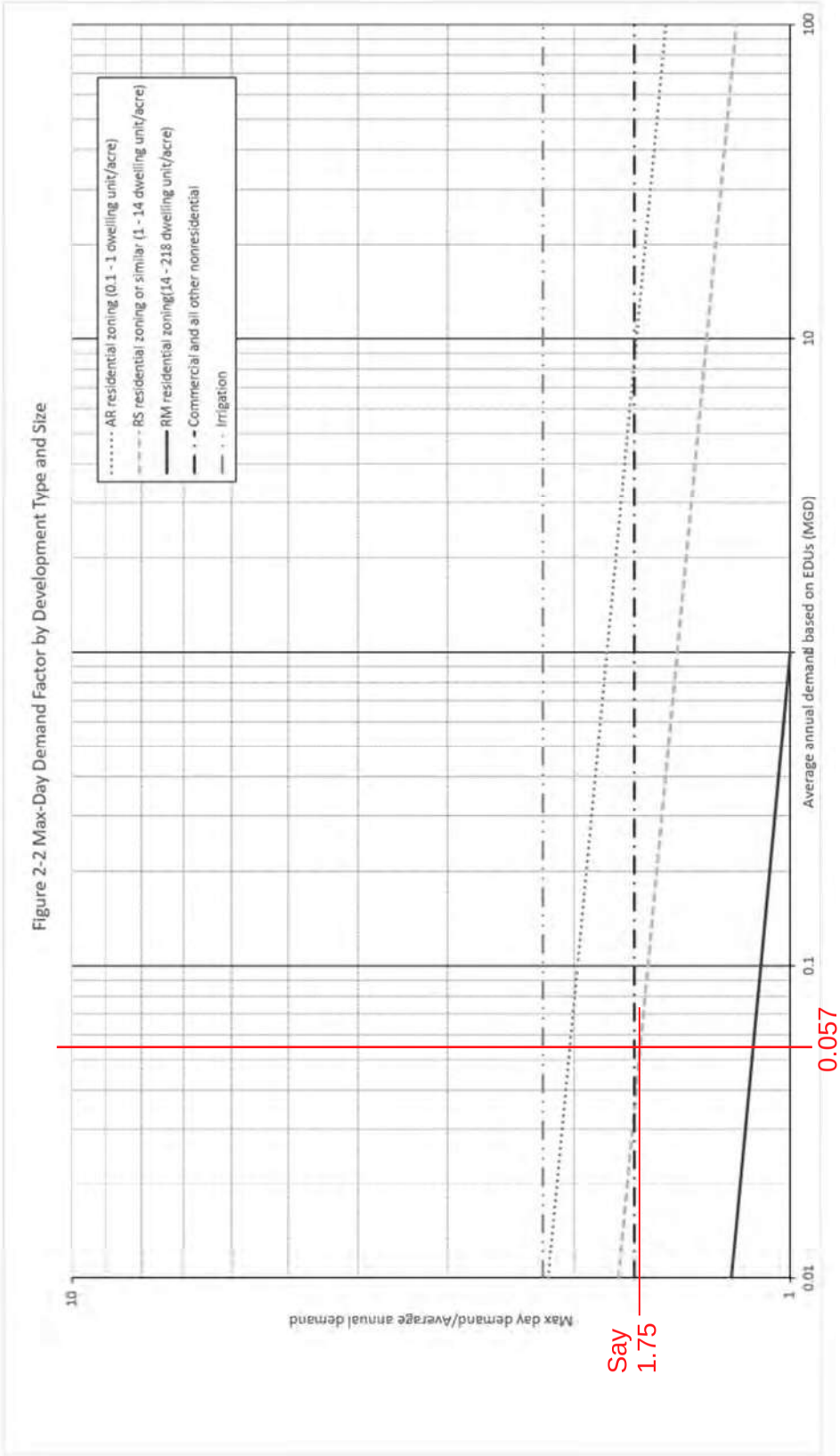


Figure 2-2 Max-Day Demand Factor by Development Type and Size
AR residential zoning (0.1 - 1 dwelling unit/acre)
RS residential zoning or similar (1 - 14 dwelling unit/acre)
RM residential zoning(14 - 218 dwelling unit/acre)
Commercial and all other nonresidential
Irrigation
Max day demand/Average annual demand
Average annual demand based on EDUs (MGD)
10
1
0.01
0.1
10
100
0.057
Say
1.75

APPENDIX B

FIRE HYDRANT FLOW TEST DATA

City of San Diego
Development Services
Attention: **Hydrant Flow Request**
1222 First Ave., MS-401
San Diego, CA 92101
(619) 446-5000

Hydrant Flow Request

FORM
DS-160
October 2016

Fill out the information below completely for all sprinkler system flow requests, including NFPA 13, 13D and 13R systems. E-mail form to: DSDHydrantFlow@sandiego.gov, or mail request to the above address.

Please print or type legibly.

Company Requesting Hydrant Flow:
Dexter Wilson Engineering Inc.

Telephone No: (760)438-4422
Fax No:
E-mail Address: kathleen@dwilsoneng.com

Project Number for the Building Permits:

Location of Hydrants:
Angelique Street between Cypress Canyon Road and Nikita Court

Cross Street: Cypress Canyon Road
City: San Diego
State: CA
ZIP Code: 92131

FOR CITY USE ONLY

Facility Sequence Number: (FSN): 5194461

Static: 73.92 PSI
Elevation: 842 FEET

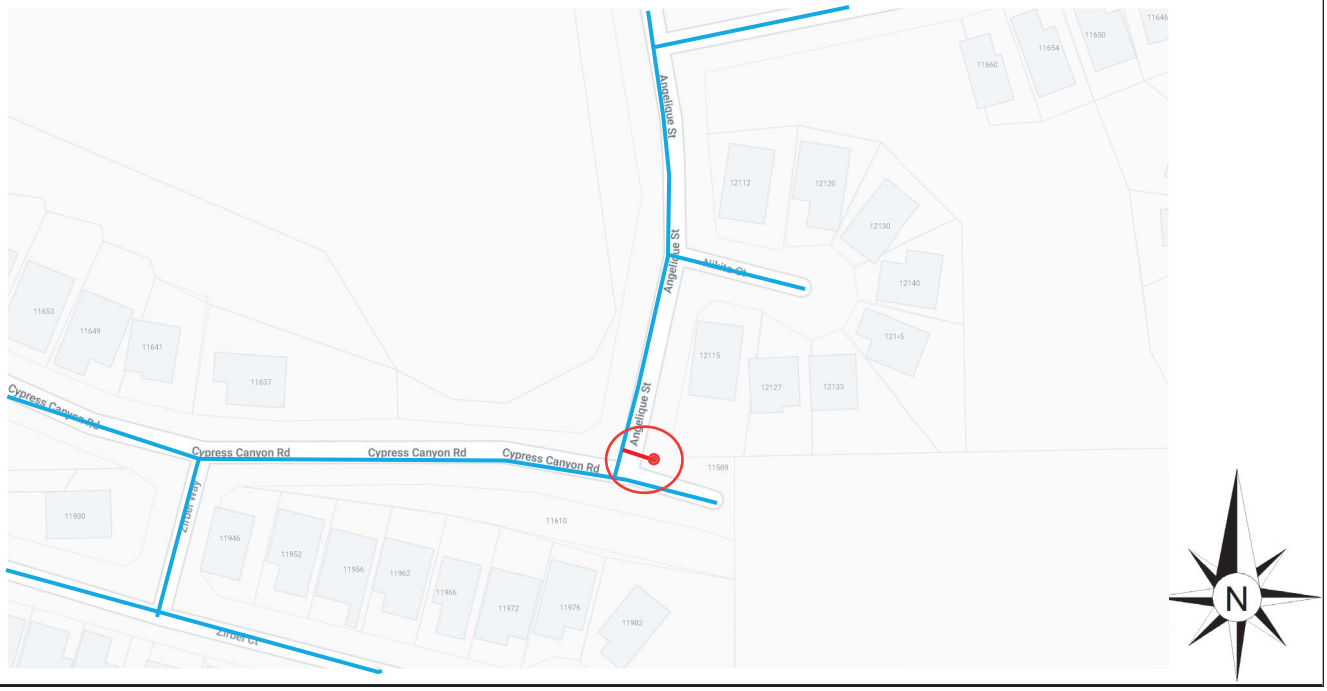
Pitot: ----- PSI
Residual: 63.67 PSI

Date: 4/7/2021
Flow: 1246 GPM

Researched in database by: Anthony Larkins

The information provided above is based upon a water model. It is the contractor's responsibility to confirm the available static pressure at the system point of connection. If a discrepancy is noticed at that time, notify DSDHydrantFlow@sandiego.gov as soon as possible.

Please draw an accurate map for fire hydrant data



Fire Hydrant Flow Test Date 5/13/2022

Input Flow Test Results

Static Pressure	73.92	PSI		
Residual Pressure	63.67	PSI		
Hydrant Flow	1246	GPM		
Actual Hydrant Elevation		Feet	HGL	Feet
Estimated Hydrant Elevation	842	Feet	HGL	1012.6 Feet

Equation $\Delta H = k\,Q^{1.85}$

k = 4.43865E-05

Extrapolated Calculations

	Q, gpm	Residual Pressure	Available HGL
ADD	39.9	73.9 psi	1012.6 ft
MDD	69.825	73.9 psi	1012.5 ft
PHD	209.475	73.5 psi	1011.7 ft
	750	69.9 psi	1003.4 ft
	1000	67.1 psi	996.9 ft
	1250	63.6 psi	988.8 ft
	1500	59.5 psi	979.3 ft
MDD+FIRE (SFD)	1569.825	58.2 psi	976.3 ft
	1769.825	54.3 psi	967.3 ft
	1819.825	53.3 psi	964.9 ft
	1869.825	52.2 psi	962.5 ft
	1919.825	51.1 psi	960.0 ft
	1969.825	50.0 psi	957.4 ft
	2019.825	48.9 psi	954.8 ft
	2107.73	46.8 psi	950.0 ft
MAX FF	1869.825	52.2 psi	962.5 ft
	2819.825	27.5 psi	905.4 ft
MDD+FIRE (MFD)	3069.825	19.6 psi	887.2 ft

APPENDIX C

COMPUTER MODEL OUTPUT

ONE SOURCE CLOSED

ONE SOURCE CLOSED

The following conditions were modeled:

1. Average Day Demand

2. Maximum Day Demand

3. Peak Hour Demand

4. Maximum Day Demand plus 1,500 gpm Fire Flow at Node 52

5. Maximum Day Demand plus 1,500 gpm Fire Flow at Node 28

6. Maximum Day Demand plus 1,500 gpm Fire Flow at Node 68

7. Maximum Available Fire Flow for Multi-Family Units (Node 32)

U N I T S S P E C I F I E D

FLOWRATE ..... = gallons/minute
HEAD (HGL) ..... = feet
PRESSURE ..... = psig

P I P E L I N E D A T A

STATUS CODE: XX -CLOSED PIPE CV -CHECK VALVE

PIPE NAME	NODE NAMES #1	#2	LENGTH (ft)	DIAMETER (in)	ROUGHNESS COEFF.	MINOR LOSS COEFF.
1	0	2	277.40	12.00	120.0000	0.35
5	2	8	34.50	16.00	120.0000	1.50
9	8	12	59.70	16.00	120.0000	0.00
13	12	16	283.40	16.00	120.0000	2.20
17	16	20	307.10	16.00	120.0000	1.50
21	20	24	250.30	16.00	120.0000	1.70
25	28	24	445.80	16.00	120.0000	0.00
29	32	28	98.00	16.00	120.0000	1.50
33	32	36	107.20	8.00	120.0000	1.30
37	32	60	237.00	16.00	120.0000	1.50
39	20	40	148.30	8.00	120.0000	1.30
41	44	40	110.30	8.00	120.0000	1.30
45	44	48	103.08	8.00	120.0000	0.70
47	44	56	452.00	8.00	120.0000	1.70
49	48	52	200.39	8.00	120.0000	0.35
57	56	60	222.90	8.00	120.0000	1.50
61	60	64	334.90	16.00	120.0000	1.50
65	64	68	298.40	16.00	120.0000	0.90

P U M P/L O S S E L E M E N T D A T A

THERE IS A DEVICE AT NODE 0 DESCRIBED BY THE FOLLOWING DATA: (ID= 3)

HEAD (ft)	FLOWRATE (gpm)
170.58	0.00
146.93	1246.00
85.19	2492.00

N O D E D A T A

NODE NAME	NODE TITLE	EXTERNAL DEMAND (gpm)	JUNCTION ELEVATION (ft)	EXTERNAL GRADE (ft)
2		0.00	846.00	
8		0.00	846.00	
12		0.00	852.00	
16		1.80	855.00	
20		2.60	857.00	
24		4.70	875.00	
28		4.40	890.00	
32		3.00	892.00	
36		1.50	892.00	
40		1.10	858.00	
44		4.00	860.00	
48		4.00	863.00	
52		2.20	866.00	

56	5.50	892.00	
60	3.70	896.00	
64	1.80	902.00	
68	0.00	899.80	
0	----	842.00	842.00

O U T P U T O P T I O N D A T A

OUTPUT SELECTION: ALL RESULTS ARE INCLUDED IN THE TABULATED OUTPUT
MAXIMUM AND MINIMUM PRESSURES = 3
MAXIMUM AND MINIMUM VELOCITIES = 3

S Y S T E M C O N F I G U R A T I O N

NUMBER OF PIPES .....(P) = 18
NUMBER OF END NODES .....(J) = 17
NUMBER OF PRIMARY LOOPS .....(L) = 1
NUMBER OF SUPPLY NODES .....(F) = 1
NUMBER OF SUPPLY ZONES .....(Z) = 1

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Case: 1 = AVERAGE DAY DEMAND

P I P E L I N E R E S U L T S

STATUS CODE: XX -CLOSED PIPE CV -CHECK VALVE

PIPE NAME	NODE NUMBERS #1	#2	FLOWRATE gpm	HEAD LOSS ft	MINOR LOSS ft	LINE VELO. ft/s	HL+ML/ 1000 ft/f	HL/ 1000 ft/f
1	0	2	40.30	0.00	0.00	0.11	0.01	0.01
5	2	8	40.30	0.00	0.00	0.06	0.00	0.00
9	8	12	40.30	0.00	0.00	0.06	0.00	0.00
13	12	16	40.30	0.00	0.00	0.06	0.00	0.00
17	16	20	38.50	0.00	0.00	0.06	0.00	0.00
21	20	24	25.84	0.00	0.00	0.04	0.00	0.00
25	28	24	-21.14	0.00	0.00	0.03	0.00	0.00
29	32	28	-16.74	0.00	0.00	0.03	0.00	0.00
33	32	36	1.50	0.00	0.00	0.01	0.00	0.00
37	32	60	12.24	0.00	0.00	0.02	0.00	0.00
39	20	40	10.06	0.00	0.00	0.06	0.00	0.00
41	44	40	-8.96	0.00	0.00	0.06	0.00	0.00
45	44	48	6.20	0.00	0.00	0.04	0.00	0.00
47	44	56	-1.24	0.00	0.00	0.01	0.00	0.00
49	48	52	2.20	0.00	0.00	0.01	0.00	0.00
57	56	60	-6.74	0.00	0.00	0.04	0.00	0.00
61	60	64	1.80	0.00	0.00	0.00	0.00	0.00
65	64	68	0.00	0.00	0.00	0.00	0.00	0.00

P U M P/L O S S E L E M E N T R E S U L T S

NAME	FLOWRATE gpm	INLET HEAD ft	OUTLET HEAD ft	PUMP HEAD ft
0	40.30	0.00	170.54	170.5

N O D E R E S U L T S

NODE NAME	NODE TITLE	EXTERNAL DEMAND gpm	HYDRAULIC GRADE ft	NODE ELEVATION ft	PRESSURE HEAD ft	NODE PRESSURE psi
2		0.00	1012.54	846.00	166.54	72.17
8		0.00	1012.54	846.00	166.54	72.17
12		0.00	1012.54	852.00	160.54	69.57
16		1.80	1012.54	855.00	157.54	68.27
20		2.60	1012.54	857.00	155.54	67.40
24		4.70	1012.54	875.00	137.54	59.60
28		4.40	1012.54	890.00	122.54	53.10
32		3.00	1012.54	892.00	120.54	52.23
36		1.50	1012.54	892.00	120.54	52.23
40		1.10	1012.54	858.00	154.54	66.97
44		4.00	1012.54	860.00	152.54	66.10
48		4.00	1012.54	863.00	149.54	64.80
52		2.20	1012.54	866.00	146.54	63.50
56		5.50	1012.54	892.00	120.54	52.23
60		3.70	1012.54	896.00	116.54	50.50
64		1.80	1012.54	902.00	110.54	47.90
68		0.00	1012.54	899.80	112.74	48.85
0		----	1012.54	842.00	170.54	73.90

M A X I M U M A N D M I N I M U M V A L U E S

P R E S S U R E S

JUNCTION NUMBER	MAXIMUM PRESSURES psi	JUNCTION NUMBER	MINIMUM PRESSURES psi
0	73.90	64	47.90
2	72.17	68	48.85
8	72.17	60	50.50

V E L O C I T I E S

PIPE NUMBER	MAXIMUM VELOCITY (ft/s)	PIPE NUMBER	MINIMUM VELOCITY (ft/s)
1	0.11	61	0.00
5	0.06	47	0.01
9	0.06	33	0.01

S U M M A R Y O F I N F L O W S A N D O U T F L O W S

(+) INFLOWS INTO THE SYSTEM FROM SUPPLY NODES
(-) OUTFLOWS FROM THE SYSTEM INTO SUPPLY NODES

NODE NAME	FLOWRATE gpm	NODE TITLE
0	40.30	

NET SYSTEM INFLOW = 40.30
NET SYSTEM OUTFLOW = 0.00
NET SYSTEM DEMAND = 40.30

==========

Case: 2 = **MAXIMUM DAY DEMAND**

P I P E L I N E R E S U L T S

STATUS CODE: XX -CLOSED PIPE CV -CHECK VALVE

PIPE NAME	NODE NUMBERS #1	#2	FLOWRATE gpm	HEAD LOSS ft	MINOR LOSS ft	LINE VELO. ft/s	HL+ML/ 1000 ft/f	HL/ 1000 ft/f
1	0	2	70.53	0.01	0.00	0.20	0.02	0.02
5	2	8	70.53	0.00	0.00	0.11	0.01	0.01
9	8	12	70.53	0.00	0.00	0.11	0.01	0.01
13	12	16	70.53	0.00	0.00	0.11	0.01	0.01
17	16	20	67.38	0.00	0.00	0.11	0.01	0.00
21	20	24	45.23	0.00	0.00	0.07	0.00	0.00
25	28	24	-37.01	0.00	0.00	0.06	0.00	0.00
29	32	28	-29.31	0.00	0.00	0.05	0.00	0.00
33	32	36	2.62	0.00	0.00	0.02	0.00	0.00
37	32	60	21.43	0.00	0.00	0.03	0.00	0.00
39	20	40	17.59	0.00	0.00	0.11	0.01	0.01
41	44	40	-15.67	0.00	0.00	0.10	0.01	0.01
45	44	48	10.85	0.00	0.00	0.07	0.01	0.00
47	44	56	-2.18	0.00	0.00	0.01	0.00	0.00
49	48	52	3.85	0.00	0.00	0.02	0.00	0.00
57	56	60	-11.81	0.00	0.00	0.08	0.01	0.01
61	60	64	3.15	0.00	0.00	0.01	0.00	0.00
65	64	68	0.00	0.00	0.00	0.00	0.00	0.00

P U M P/L O S S E L E M E N T R E S U L T S

NAME	FLOWRATE gpm	INLET HEAD ft	OUTLET HEAD ft	PUMP HEAD ft
0	70.53	0.00	170.47	170.5

N O D E R E S U L T S

NODE NAME	NODE TITLE	EXTERNAL DEMAND gpm	HYDRAULIC GRADE ft	NODE ELEVATION ft	PRESSURE HEAD ft	NODE PRESSURE psi
2		0.00	1012.46	846.00	166.46	72.13
8		0.00	1012.46	846.00	166.46	72.13
12		0.00	1012.46	852.00	160.46	69.53
16		3.15(1.75)	1012.46	855.00	157.46	68.23
20		4.55(1.75)	1012.46	857.00	155.46	67.37
24		8.23(1.75)	1012.46	875.00	137.46	59.56
28		7.70(1.75)	1012.46	890.00	122.46	53.06
32		5.25(1.75)	1012.46	892.00	120.46	52.20
36		2.62(1.75)	1012.46	892.00	120.46	52.20
40		1.92(1.75)	1012.46	858.00	154.46	66.93
44		7.00(1.75)	1012.45	860.00	152.45	66.06
48		7.00(1.75)	1012.45	863.00	149.45	64.76
52		3.85(1.75)	1012.45	866.00	146.45	63.46
56		9.62(1.75)	1012.45	892.00	120.45	52.20
60		6.47(1.75)	1012.46	896.00	116.46	50.46
64		3.15(1.75)	1012.46	902.00	110.46	47.86
68		0.00	1012.46	899.80	112.66	48.82
0		----	1012.47	842.00	170.47	73.87

M A X I M U M A N D M I N I M U M V A L U E S

P R E S S U R E S

JUNCTION NUMBER	MAXIMUM PRESSURES psi	JUNCTION NUMBER	MINIMUM PRESSURES psi
0	73.87	64	47.86
2	72.13	68	48.82
8	72.13	60	50.46

V E L O C I T I E S

PIPE NUMBER	MAXIMUM VELOCITY (ft/s)	PIPE NUMBER	MINIMUM VELOCITY (ft/s)
1	0.20	61	0.01
5	0.11	47	0.01
9	0.11	33	0.02

S U M M A R Y O F I N F L O W S A N D O U T F L O W S

(+) INFLOWS INTO THE SYSTEM FROM SUPPLY NODES
(-) OUTFLOWS FROM THE SYSTEM INTO SUPPLY NODES

NODE NAME	FLOWRATE gpm	NODE TITLE
0	70.53	

NET SYSTEM INFLOW = 70.53
NET SYSTEM OUTFLOW = 0.00
NET SYSTEM DEMAND = 70.53

==========

Case: 3 = **PEAK HOUR DEMAND**

P I P E L I N E R E S U L T S

STATUS CODE: XX -CLOSED PIPE CV -CHECK VALVE

PIPE NAME	NODE NUMBERS #1	#2	FLOWRATE gpm	HEAD LOSS ft	MINOR LOSS ft	LINE VELO. ft/s	HL+ML/ 1000 ft/f	HL/ 1000 ft/f
1	0	2	211.57	0.05	0.00	0.60	0.17	0.17
5	2	8	211.57	0.00	0.00	0.34	0.12	0.04
9	8	12	211.57	0.00	0.00	0.34	0.04	0.04
13	12	16	211.57	0.01	0.00	0.34	0.05	0.04
17	16	20	202.12	0.01	0.00	0.32	0.05	0.04
21	20	24	135.77	0.00	0.00	0.22	0.02	0.02
25	28	24	-111.09	0.01	0.00	0.18	0.01	0.01
29	32	28	-87.99	0.00	0.00	0.14	0.01	0.01
33	32	36	7.88	0.00	0.00	0.05	0.00	0.00
37	32	60	64.37	0.00	0.00	0.10	0.01	0.00
39	20	40	52.71	0.01	0.00	0.34	0.11	0.09
41	44	40	-46.93	0.01	0.00	0.30	0.09	0.07
45	44	48	32.55	0.00	0.00	0.21	0.04	0.04
47	44	56	-6.62	0.00	0.00	0.04	0.00	0.00
49	48	52	11.55	0.00	0.00	0.07	0.01	0.01
57	56	60	-35.49	0.01	0.00	0.23	0.05	0.04
61	60	64	9.45	0.00	0.00	0.02	0.00	0.00
65	64	68	0.00	0.00	0.00	0.00	0.00	0.00

P U M P/L O S S E L E M E N T R E S U L T S

NAME	FLOWRATE gpm	INLET HEAD ft	OUTLET HEAD ft	PUMP HEAD ft
0	211.57	0.00	169.70	169.7

N O D E R E S U L T S

NODE NAME	NODE TITLE	EXTERNAL DEMAND gpm	HYDRAULIC GRADE ft	NODE ELEVATION ft	PRESSURE HEAD ft	NODE PRESSURE psi
2		0.00	1011.65	846.00	165.65	71.78
8		0.00	1011.65	846.00	165.65	71.78
12		0.00	1011.64	852.00	159.64	69.18
16		9.45(5.25)	1011.63	855.00	156.63	67.87
20		13.65(5.25)	1011.61	857.00	154.61	67.00
24		24.67(5.25)	1011.61	875.00	136.61	59.20
28		23.10(5.25)	1011.60	890.00	121.60	52.69
32		15.75(5.25)	1011.60	892.00	119.60	51.83
36		7.88(5.25)	1011.60	892.00	119.60	51.83
40		5.78(5.25)	1011.60	858.00	153.60	66.56
44		21.00(5.25)	1011.59	860.00	151.59	65.69
48		21.00(5.25)	1011.58	863.00	148.58	64.39
52		11.55(5.25)	1011.58	866.00	145.58	63.09
56		28.88(5.25)	1011.59	892.00	119.59	51.82
60		19.42(5.25)	1011.60	896.00	115.60	50.09
64		9.45(5.25)	1011.60	902.00	109.60	47.49
68		0.00	1011.60	899.80	111.80	48.45
0		----	1011.70	842.00	169.70	73.54

M A X I M U M A N D M I N I M U M V A L U E S

P R E S S U R E S

JUNCTION NUMBER	MAXIMUM PRESSURES psi	JUNCTION NUMBER	MINIMUM PRESSURES psi
0	73.54	64	47.49
2	71.78	68	48.45
8	71.78	60	50.09

V E L O C I T I E S

PIPE NUMBER	MAXIMUM VELOCITY (ft/s)	PIPE NUMBER	MINIMUM VELOCITY (ft/s)
1	0.60	61	0.02
5	0.34	47	0.04
9	0.34	33	0.05

S U M M A R Y O F I N F L O W S A N D O U T F L O W S

(+) INFLOWS INTO THE SYSTEM FROM SUPPLY NODES
(-) OUTFLOWS FROM THE SYSTEM INTO SUPPLY NODES

NODE NAME	FLOWRATE gpm	NODE TITLE
0	211.57	

NET SYSTEM INFLOW = 211.57
NET SYSTEM OUTFLOW = 0.00
NET SYSTEM DEMAND = 211.58

==========

Case: 4 = **MAXIMUM DAY DEMAND PLUS 1,500 GPM FIRE FLOW AT NODE 52**

P I P E L I N E R E S U L T S

STATUS CODE: XX -CLOSED PIPE CV -CHECK VALVE

PIPE NAME	NODE NUMBERS #1	#2	FLOWRATE gpm	HEAD LOSS ft	MINOR LOSS ft	LINE VELO. ft/s	HL+ML/ 1000 ft/f	HL/ 1000 ft/f
1	0	2	1570.52	1.88	0.11	4.45	7.17	6.79
5	2	8	1570.52	0.06	0.15	2.51	5.91	1.67
9	8	12	1570.52	0.10	0.00	2.51	1.67	1.67
13	12	16	1570.52	0.47	0.21	2.51	2.43	1.67
17	16	20	1567.37	0.51	0.15	2.50	2.14	1.67
21	20	24	622.91	0.08	0.03	0.99	0.41	0.30
25	28	24	-614.68	0.13	0.00	0.98	0.29	0.29
29	32	28	-606.98	0.03	0.02	0.97	0.51	0.29
33	32	36	2.62	0.00	0.00	0.02	0.00	0.00
37	32	60	599.11	0.07	0.02	0.96	0.37	0.28
39	20	40	939.91	2.80	0.73	6.00	23.79	18.89
41	44	40	-937.99	2.08	0.72	5.99	25.38	18.82
45	44	48	1510.85	4.69	1.01	9.64	55.30	45.50
47	44	56	-579.86	3.49	0.36	3.70	8.52	7.72
49	48	52	1503.85	9.04	0.50	9.60	47.61	45.11

57	56	60	-589.49	1.77	0.33	3.76	9.44	7.96
61	60	64	3.15	0.00	0.00	0.01	0.00	0.00
65	64	68	0.00	0.00	0.00	0.00	0.00	0.00

P U M P/L O S S E L E M E N T R E S U L T S

NAME	FLOWRATE gpm	INLET HEAD ft	OUTLET HEAD ft	PUMP HEAD ft
0	1570.52	0.00	134.27	134.3

N O D E R E S U L T S

NODE NAME	NODE TITLE	EXTERNAL DEMAND gpm	HYDRAULIC GRADE ft	NODE ELEVATION ft	PRESSURE HEAD ft	NODE PRESSURE psi
2		0.00	974.28	846.00	128.28	55.59
8		0.00	974.08	846.00	128.08	55.50
12		0.00	973.98	852.00	121.98	52.86
16		3.15(1.75)	973.29	855.00	118.29	51.26
20		4.55(1.75)	972.63	857.00	115.63	50.11
24		8.23(1.75)	972.53	875.00	97.53	42.26
28		7.70(1.75)	972.40	890.00	82.40	35.71
32		5.25(1.75)	972.35	892.00	80.35	34.82
36		2.62(1.75)	972.35	892.00	80.35	34.82
40		1.92(1.75)	969.10	858.00	111.10	48.14
44		7.00(1.75)	966.30	860.00	106.30	46.07
48		7.00(1.75)	960.60	863.00	97.60	42.30
52		1503.85(**)	951.06	866.00	85.06	36.86
56		9.62(1.75)	970.16	892.00	78.16	33.87
60		6.47(1.75)	972.26	896.00	76.26	33.05
64		3.15(1.75)	972.26	902.00	70.26	30.45
68		0.00	972.26	899.80	72.46	31.40
0		----	976.27	842.00	134.27	58.18

M A X I M U M A N D M I N I M U M V A L U E S

P R E S S U R E S

JUNCTION NUMBER	MAXIMUM PRESSURES psi	JUNCTION NUMBER	MINIMUM PRESSURES psi
0	58.18	64	30.45
2	55.59	68	31.40
8	55.50	60	33.05

V E L O C I T I E S

PIPE NUMBER	MAXIMUM VELOCITY (ft/s)	PIPE NUMBER	MINIMUM VELOCITY (ft/s)
45	9.64	61	0.01
49	9.60	33	0.02
39	6.00	37	0.96

S U M M A R Y O F I N F L O W S A N D O U T F L O W S

(+) INFLOWS INTO THE SYSTEM FROM SUPPLY NODES
(-) OUTFLOWS FROM THE SYSTEM INTO SUPPLY NODES

NODE NAME	FLOWRATE gpm	NODE TITLE
0	1570.52	

NET SYSTEM INFLOW = 1570.52
NET SYSTEM OUTFLOW = 0.00
NET SYSTEM DEMAND = 1570.52

==========

Case: 5 = **MAXIMUM DAY DEMAND PLUS 1,500 GPM FIRE FLOW AT NODE 28**

P I P E L I N E R E S U L T S

STATUS CODE: XX -CLOSED PIPE CV -CHECK VALVE

PIPE NAME	NODE NUMBERS #1	#2	FLOWRATE gpm	HEAD LOSS ft	MINOR LOSS ft	LINE VELO. ft/s	HL+ML/ 1000 ft/f	HL/ 1000 ft/f
1	0	2	1570.52	1.88	0.11	4.45	7.17	6.79
5	2	8	1570.52	0.06	0.15	2.51	5.91	1.67
9	8	12	1570.52	0.10	0.00	2.51	1.67	1.67
13	12	16	1570.52	0.47	0.21	2.51	2.43	1.67
17	16	20	1567.37	0.51	0.15	2.50	2.14	1.67
21	20	24	1361.17	0.32	0.12	2.17	1.78	1.28
25	28	24	-1352.94	0.57	0.00	2.16	1.27	1.27
29	32	28	154.76	0.00	0.00	0.25	0.04	0.02
33	32	36	2.62	0.00	0.00	0.02	0.00	0.00
37	32	60	-162.63	0.01	0.00	0.26	0.03	0.03
39	20	40	201.66	0.16	0.03	1.29	1.32	1.09
41	44	40	-199.73	0.12	0.03	1.27	1.37	1.07
45	44	48	10.85	0.00	0.00	0.07	0.01	0.00
47	44	56	181.88	0.41	0.04	1.16	0.98	0.90
49	48	52	3.85	0.00	0.00	0.02	0.00	0.00
57	56	60	172.26	0.18	0.03	1.10	0.94	0.82
61	60	64	3.15	0.00	0.00	0.01	0.00	0.00
65	64	68	0.00	0.00	0.00	0.00	0.00	0.00

P U M P/L O S S E L E M E N T R E S U L T S

NAME	FLOWRATE gpm	INLET HEAD ft	OUTLET HEAD ft	PUMP HEAD ft
0	1570.52	0.00	134.27	134.3

N O D E R E S U L T S

NODE NAME	NODE TITLE	EXTERNAL DEMAND gpm	HYDRAULIC GRADE ft	NODE ELEVATION ft	PRESSURE HEAD ft	NODE PRESSURE psi
2		0.00	974.28	846.00	128.28	55.59
8		0.00	974.08	846.00	128.08	55.50
12		0.00	973.98	852.00	121.98	52.86
16		3.15(1.75)	973.29	855.00	118.29	51.26
20		4.55(1.75)	972.63	857.00	115.63	50.11
24		8.23(1.75)	972.19	875.00	97.19	42.11
28		1507.70(**)	971.62	890.00	81.62	35.37
32		5.25(1.75)	971.62	892.00	79.62	34.50
36		2.62(1.75)	971.62	892.00	79.62	34.50
40		1.92(1.75)	972.44	858.00	114.44	49.59
44		7.00(1.75)	972.28	860.00	112.28	48.66
48		7.00(1.75)	972.28	863.00	109.28	47.36
52		3.85(1.75)	972.28	866.00	106.28	46.06
56		9.62(1.75)	971.84	892.00	79.84	34.60
60		6.47(1.75)	971.63	896.00	75.63	32.77
64		3.15(1.75)	971.63	902.00	69.63	30.17
68		0.00	971.63	899.80	71.83	31.13
0		----	976.27	842.00	134.27	58.18

M A X I M U M A N D M I N I M U M V A L U E S

P R E S S U R E S

JUNCTION NUMBER	MAXIMUM PRESSURES psi	JUNCTION NUMBER	MINIMUM PRESSURES psi
0	58.18	64	30.17
2	55.59	68	31.13
8	55.50	60	32.77

V E L O C I T I E S

PIPE NUMBER	MAXIMUM VELOCITY (ft/s)	PIPE NUMBER	MINIMUM VELOCITY (ft/s)
1	4.45	61	0.01
5	2.51	33	0.02
9	2.51	49	0.02

S U M M A R Y O F I N F L O W S A N D O U T F L O W S

(+) INFLOWS INTO THE SYSTEM FROM SUPPLY NODES
(-) OUTFLOWS FROM THE SYSTEM INTO SUPPLY NODES

NODE NAME	FLOWRATE gpm	NODE TITLE
0	1570.52	

NET SYSTEM INFLOW = 1570.52
NET SYSTEM OUTFLOW = 0.00
NET SYSTEM DEMAND = 1570.52

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Case: 6 = **MAXIMUM DAY DEMAND PLUS 1,500 GPM FIRE FLOW AT NODE 68**

P I P E L I N E R E S U L T S

STATUS CODE: XX -CLOSED PIPE CV -CHECK VALVE

PIPE NAME	NODE NUMBERS #1	#2	FLOWRATE gpm	HEAD LOSS ft	MINOR LOSS ft	LINE VELO. ft/s	HL+ML/ 1000 ft/f	HL/ 1000 ft/f
1	0	2	1570.52	1.88	0.11	4.45	7.17	6.79
5	2	8	1570.52	0.06	0.15	2.51	5.91	1.67
9	8	12	1570.52	0.10	0.00	2.51	1.67	1.67
13	12	16	1570.52	0.47	0.21	2.51	2.43	1.67
17	16	20	1567.37	0.51	0.15	2.50	2.14	1.67
21	20	24	1313.43	0.30	0.12	2.10	1.66	1.20
25	28	24	-1305.20	0.53	0.00	2.08	1.19	1.19
29	32	28	-1297.50	0.12	0.10	2.07	2.19	1.17
33	32	36	2.62	0.00	0.00	0.02	0.00	0.00
37	32	60	1289.63	0.28	0.10	2.06	1.58	1.16
39	20	40	249.40	0.24	0.05	1.59	1.96	1.62
41	44	40	-247.47	0.18	0.05	1.58	2.05	1.60
45	44	48	10.85	0.00	0.00	0.07	0.01	0.00
47	44	56	229.62	0.63	0.06	1.47	1.51	1.39
49	48	52	3.85	0.00	0.00	0.02	0.00	0.00
57	56	60	220.00	0.29	0.05	1.40	1.49	1.28
61	60	64	1503.15	0.52	0.13	2.40	1.94	1.54
65	64	68	1500.00	0.46	0.08	2.39	1.80	1.54

P U M P/L O S S E L E M E N T R E S U L T S

NAME	FLOWRATE gpm	INLET HEAD ft	OUTLET HEAD ft	PUMP HEAD ft
0	1570.52	0.00	134.27	134.3

N O D E R E S U L T S

NODE NAME	NODE TITLE	EXTERNAL DEMAND gpm	HYDRAULIC GRADE ft	NODE ELEVATION ft	PRESSURE HEAD ft	NODE PRESSURE psi
2		0.00	974.28	846.00	128.28	55.59
8		0.00	974.08	846.00	128.08	55.50
12		0.00	973.98	852.00	121.98	52.86
16		3.15(1.75)	973.29	855.00	118.29	51.26
20		4.55(1.75)	972.63	857.00	115.63	50.11
24		8.23(1.75)	972.21	875.00	97.21	42.13
28		7.70(1.75)	971.69	890.00	81.69	35.40
32		5.25(1.75)	971.47	892.00	79.47	34.44
36		2.62(1.75)	971.47	892.00	79.47	34.44
40		1.92(1.75)	972.34	858.00	114.34	49.55
44		7.00(1.75)	972.11	860.00	112.11	48.58
48		7.00(1.75)	972.11	863.00	109.11	47.28
52		3.85(1.75)	972.11	866.00	106.11	45.98
56		9.62(1.75)	971.43	892.00	79.43	34.42
60		6.47(1.75)	971.10	896.00	75.10	32.54
64		3.15(1.75)	970.45	902.00	68.45	29.66
68		1500.00	969.91	899.80	70.11	30.38
0		----	976.27	842.00	134.27	58.18

M A X I M U M A N D M I N I M U M V A L U E S

P R E S S U R E S

JUNCTION NUMBER	MAXIMUM PRESSURES psi	JUNCTION NUMBER	MINIMUM PRESSURES psi
0	58.18	64	29.66
2	55.59	68	30.38
8	55.50	60	32.54

V E L O C I T I E S

PIPE NUMBER	MAXIMUM VELOCITY (ft/s)	PIPE NUMBER	MINIMUM VELOCITY (ft/s)
1	4.45	33	0.02
5	2.51	49	0.02
9	2.51	45	0.07

S U M M A R Y O F I N F L O W S A N D O U T F L O W S

(+) INFLOWS INTO THE SYSTEM FROM SUPPLY NODES
(-) OUTFLOWS FROM THE SYSTEM INTO SUPPLY NODES

NODE NAME	FLOWRATE gpm	NODE TITLE
0	1570.52	

NET SYSTEM INFLOW = 1570.52
NET SYSTEM OUTFLOW = 0.00
NET SYSTEM DEMAND = 1570.53

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Case: 7 = **MAXIMUM AVAILABLE FIRE FLOW FOR MULTI-FAMILY UNITS (NODE 32)**

P I P E L I N E R E S U L T S

STATUS CODE: XX -CLOSED PIPE CV -CHECK VALVE

PIPE NAME	NODE NUMBERS #1	#2	FLOWRATE gpm	HEAD LOSS ft	MINOR LOSS ft	LINE VELO. ft/s	HL+ML/ 1000 ft/f	HL/ 1000 ft/f
1	0	2	1970.52	2.87	0.17	5.59	10.94	10.33
5	2	8	1970.52	0.09	0.23	3.14	9.22	2.54
9	8	12	1970.52	0.15	0.00	3.14	2.54	2.54
13	12	16	1970.52	0.72	0.34	3.14	3.74	2.54
17	16	20	1967.37	0.78	0.23	3.14	3.28	2.54
21	20	24	1688.84	0.48	0.19	2.69	2.68	1.91
25	28	24	-1680.61	0.84	0.00	2.68	1.90	1.90
29	32	28	-1672.91	0.18	0.17	2.67	3.57	1.88
33	32	36	2.62	0.00	0.00	0.02	0.00	0.00
37	32	60	-234.96	0.01	0.00	0.37	0.06	0.05
39	20	40	273.99	0.29	0.06	1.75	2.34	1.93
41	44	40	-272.06	0.21	0.06	1.74	2.45	1.90
45	44	48	10.85	0.00	0.00	0.07	0.01	0.00
47	44	56	254.21	0.76	0.07	1.62	1.83	1.68
49	48	52	3.85	0.00	0.00	0.02	0.00	0.00
57	56	60	244.59	0.35	0.06	1.56	1.82	1.56
61	60	64	3.15	0.00	0.00	0.01	0.00	0.00
65	64	68	0.00	0.00	0.00	0.00	0.00	0.00

P U M P/L O S S E L E M E N T R E S U L T S

NAME	FLOWRATE gpm	INLET HEAD ft	OUTLET HEAD ft	PUMP HEAD ft
0	1970.52	0.00	115.30	115.3

N O D E R E S U L T S

NODE NAME	NODE TITLE	EXTERNAL DEMAND gpm	HYDRAULIC GRADE ft	NODE ELEVATION ft	PRESSURE HEAD ft	NODE PRESSURE psi
2		0.00	954.27	846.00	108.27	46.92
8		0.00	953.95	846.00	107.95	46.78
12		0.00	953.80	852.00	101.80	44.11
16		3.15(1.75)	952.74	855.00	97.74	42.35
20		4.55(1.75)	951.73	857.00	94.73	41.05
24		8.23(1.75)	951.06	875.00	76.06	32.96
28		7.70(1.75)	950.22	890.00	60.22	26.09
32		1905.25(**)	949.87	892.00	57.87	25.08
36		2.62(1.75)	949.87	892.00	57.87	25.08
40		1.92(1.75)	951.38	858.00	93.38	40.47
44		7.00(1.75)	951.11	860.00	91.11	39.48
48		7.00(1.75)	951.11	863.00	88.11	38.18
52		3.85(1.75)	951.11	866.00	85.11	36.88
56		9.62(1.75)	950.29	892.00	58.29	25.26
60		6.47(1.75)	949.88	896.00	53.88	23.35
64		3.15(1.75)	949.88	902.00	47.88	20.75
68		0.00	949.88	899.80	50.08	21.70
0		----	957.30	842.00	115.30	49.97

M A X I M U M A N D M I N I M U M V A L U E S

P R E S S U R E S

JUNCTION NUMBER	MAXIMUM PRESSURES psi	JUNCTION NUMBER	MINIMUM PRESSURES psi
0	49.97	64	20.75
2	46.92	68	21.70
8	46.78	60	23.35

V E L O C I T I E S

PIPE NUMBER	MAXIMUM VELOCITY (ft/s)	PIPE NUMBER	MINIMUM VELOCITY (ft/s)
1	5.59	61	0.01
5	3.14	33	0.02
9	3.14	49	0.02

S U M M A R Y O F I N F L O W S A N D O U T F L O W S

(+) INFLOWS INTO THE SYSTEM FROM SUPPLY NODES
(-) OUTFLOWS FROM THE SYSTEM INTO SUPPLY NODES

NODE NAME	FLOWRATE gpm	NODE TITLE
0	1970.52	

NET SYSTEM INFLOW = 1970.52
NET SYSTEM OUTFLOW = 0.00
NET SYSTEM DEMAND = 1970.53

APPENDIX D

CITY-APPROVED DEVIATION REQUEST

City of San Diego
Development Services
1222 First Ave., MS-302
San Diego, CA 92101
(619) 446-5000

THE CITY OF SAN DIEGO

Deviation From Standards

FORM
DS-266
October 2021

DRAWING NUMBER(S):	DSD PROJECT NUMBER:	WBS OR IO NUMBER(S):
N/A	PRJ-0674401	N/A

PROJECT TITLE/DESCRIPTION:

RENZULLI ESTATES

PROJECT LOCATION(S):

East extension of Cypress Canyon Road, south of Libelle Court

PLACE RCE STAMP OF EOR HERE:

REGISTERED PROFESSIONAL ENGINEER
NATALIE J FRASCHETTI
C 77025
EXP. 12/31/2024
CIVIL
STATE OF CALIFORNIA

ENGINEER OF RECORD: NATALIE FRASCHETTI
(EOR) (Print Name)

(Signature) 77025 (RCE NUMBER) 5/15/2024 (Date)

STANDARDS DEVIATING FROM (e.g. 2018 Greenbook Section; 2018 Standard Drawing SDG-133 Curb Ramps Type A and B):

Water Facilities Design Guidelines, Section 2.7.2 - Domestic Pressure Criteria

LOCATIONS OF DEVIATION(S) (Street names/intersections or facility locations):

Portions of Proposed Streets: Public Street "A", Public Street "B", and Cypress Canyon Road (South), Lots 11-32, 45-66, and 101.

DESCRIPTION OF DEVIATION(S):

Static pressures of the above listed lots range from 52 psi to 64 psi. This is less than the stated criteria that "Every water main in each pressure zone must be capable of supplying a minimum static pressure of 65 psi."

REASON(S) FOR DEVIATION(S):

Proposed elevations.

MITIGATION MEASURES FOR DEVIATION:

Onsite private design (which may include individual private booster systems) will consider desired pressure and flow in each home.

SEE ATTACHED SHEETS (e.g. D sheets, photos or sketches) PROVIDE SHEET NUMBERS WITH DESCRIPTIONS.:

See January 9, 2024 "Public Water System Analysis for the Renzulli Estates Project in the City of San Diego"

REVIEWED BY:

DESIGN/PLAN CHECK ENGINEER: Irina Itkin
(Print Name)

Irina Itkin
(Signature)

08/29/2024
(Date)

APPROVED BY:

DEPUTY CITY ENGINEER (DCE): David Li
(Print Name)

David Li
(Signature)

9/3/24
(Date)

EXHIBIT A

WATER MODEL NODE AND PIPE DIAGRAM

NOTE 1

LOTS WITHIN THIS AREA RECEIVE STATIC PRESSURE LESS THAN 65 PSI. PRIVATE BOOSTER PUMPS MAY BE NECESSARY IN INDIVIDUAL PRIVATE LOTS TO ACHIEVE DESIRED PRESSURE AND FLOW.

N

0 250 FEET

ANGELIQUE ST

LIBELLE CT

MUNDIAL ST

CYPRESS CANYON RD

ZIRBEL CT

CYPRESS VALLEY DR

CYPRESS CYN RD (NORTH)

CYPRESS CYN RD (SOUTH)

PUBLIC ST "A"

PUBLIC ST "B"

CYPRESS CANYON PARK DR

SPRING CANYON RD

CMNTO DU LCE

SEE NOTE 1

SERVICE LOCATION FOR AFFORDABLE HOUSING

EX.12" EX.16" EX.8"

LEGEND

- PROJECT BOUNDARY
- EXISTING 1020 ZONE PUBLIC WATER LINE
- EXISTING 1150 ZONE PUBLIC WATER LINE
- PROPOSED ONSITE 1020 ZONE PUBLIC WATER LINE
- EXISTING PUBLIC OFFSITE FIRE HYDRANT
- PROPOSED PUBLIC ONSITE FIRE HYDRANT
- 0 COMPUTER MODEL NODE NUMBER
- 1 COMPUTER MODEL PIPE NUMBER

EXHIBIT A

NODE AND PIPE DIAGRAM

RENZULLI ESTATES

DEXTER WILSON ENGINEERING, INC.
CONSULTING ENGINEERS
(760) 438-4422

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